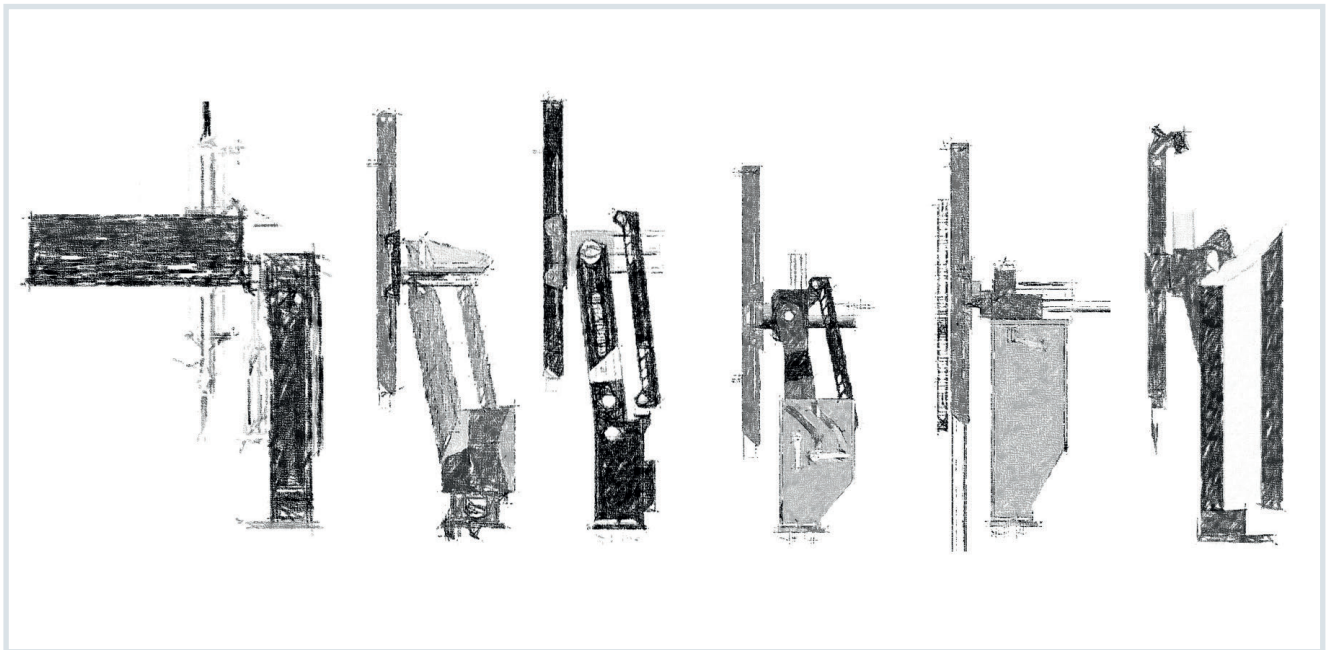


# New Kinematics for Increased Efficiency and Availability

## *The pic A Is the First Pneumatic Sprue Picker to Operate with a Swivel Arm*

Besides custom-made automation solutions, there is also increasing global demand for standardized robots. In many automation projects, they help to achieve a combination of high performance and high cost-efficiency. With the new pic A pneumatic sprue picker, the market now has a flexible, compact solution for separating sprues, and easy removal of small injection-molded parts.



The development process extends from the predecessor model ER-USP (left) via multiple concept studies to the swivel-arm design (right) of the current pic A © Engel

At its premiere at K2019, the pic A robot broke two records at once. Engel Austria GmbH, Schwertberg, Austria, declared that its goal with the new development is to place the most durable and compact sprue picker on the market. With regard to compactness, the first feedback has already been received from the market. Trodat, an international manufacturer of sophisticated stamp products based in Wels, Austria, has a great deal of experience with handling equipment from Engel. The injection-molding machines in its factory are equipped with type ER-USP

sprue pickers. Last fall, it purchased its first sprue picker of the new pic A type (Fig. 1).

"The very compact construction with the innovative kinematics gives us a clear advantage," reports Thomas Dobritzhofer, Head of Maintenance and Facility at Trodat Produktions GmbH in Wels. "We can fold in the robot arm completely and therefore no longer need to swivel the sprue picker out of the way for mold exchange. That significantly speeds up the mold set up." Trodat is now successively replacing its former sprue pickers with the new pic A generation.

Fast and simpler set-up processes contribute to increasing the availability of the injection molding machines – a factor that is essential to its efficiency and competitiveness. When the swivel arm is in the park position, the pic A frees up the entire mold mounting space. Conventional sprue pickers with a fixed X-axis would have to be dismantled or displaced to achieve this (Fig. 2).

In the pneumatic sprue picker segment, the pic A is the first robot to work with a swivel arm. It is only with this innovative kinematics that all interference »



**Fig. 1.** The swivel arm replaces the fixed X-axis.

© Engel

contours can be eliminated. "At first, the swivel arm was not intended for use with this robot type at all," says Gerald Huber, who was responsible for construction of the new sprue picker at Engel's robot factory in Dietach, Austria. The developers approached the goal via different design concepts (**Title figure**).

### **Movements in Confined Spaces**

For example, a linear kinematics, which would be able to move out of the way

behind the fixed platen was evaluated. This concept was rejected since many applications need this space for peripheral systems or additional injection units. The inspiration for the swivel arm was finally provided by e-pic type robots. This servoelectric sprue picker from Engel is also highly compact thanks to the swivel-arm kinematics.

As with the servoelectric models, the swivel arm of the pneumatic robot is responsible for movement in the X-direction, and thereby replaces the fixed X-axis (**Fig. 3**). Though looking unusual, it proves very easy to operate, since the triangular kinematics converts the vertical drive movement into a horizontal, linear demolding movement. The tool setters and plant operators therefore do not need to change the way they work.

Since the fixed X-axis is eliminated, the pic A is also particularly space saving in continuous operation. In confined molds, too, the swivel movement is very reliable and precise. The demolding stroke is continuously variable up to a maximum stroke of 400mm, which sprue pickers with conventional kinematics cannot manage.

Another new feature is that the Y-axis module can be adjusted with just a few manipulations. The rotation range of the A-axis can be flexibly adapted between 0 and 90° to suit the particular requirements (**Fig. 4**).



**Fig. 2.** In the park position, the swivel arm is completely folded in. In this way, the pic A does not need to be demounted for setting up the injection molding machine © Engel

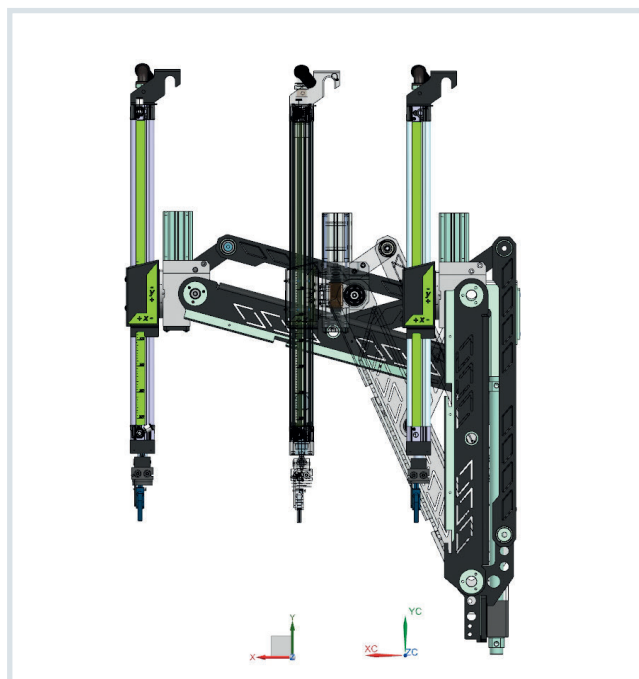
### **Robust Mechanical Systems**

The pic A is fitted with a very sturdy mechanical system to achieve a long useful lifetime. The demolding stroke is particularly torsion-resistant, and the impact is additionally damped by adjustable sliding rails.

The maximum manipulation weight at the end of the Y-axis is 1 kg. To rotate and eject relatively large sprues, a B-axis can be optionally placed between the Y-arm and sprue gripper. Overall – depending on the end-of-arm tooling – both sprues and small injection molded parts weighing up to 0.5 kg can be manipulated.

### **Standardized Operating Logic across the Entire Cell**

When used on an Engel injection-molding machine, the control system of the pic A, like the control systems on all other Engel robots, is integrated into the CC300 control system of the injection-molding machine. The greatest benefit for the user lies in the fact that the machine and sprue picker can be centrally and uniformly operated from the machine display. The standardized operating logics reduces the required training for the new robot generation, thereby further increasing the overall efficiency.



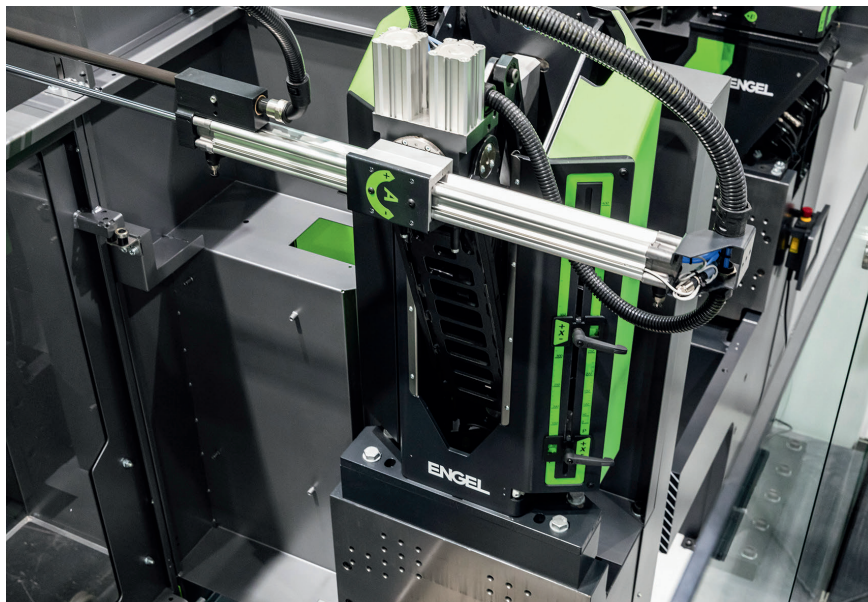
**Fig. 3.** The triangular kinematics converts the vertical drive movement into a horizontal linear demolding movement © Engel

In this integrated solution, the sprue picker is supplied with power via the injection molding machine. It can be very easily commissioned by plug & play, since, in this solution, the mechanical connection in this solution is also from a single supplier. The sprue shaft is compactly integrated into the injection-molding machine and is part of the CE safety certification (Fig. 5). Since the ER-USP predecessor model and the pic A use the same discharge chute and the same interface, existing injection molding cells can be very easily refitted with the new model. The sprue picker is compatible with all Engel injection-molding machines from the control generation CC200.

### Extra Reliability

As a pneumatic sprue picker, the pic A fulfils the strict EN ISO 10218 robot standard with performance level d/category 3 and is already comprehensively designed for two-channel switch off. The demolding stroke can be easily and reliably adjusted with only one hand. For this purpose, the pressure is automatically reduced during set-up mode. Set-up mode is activated as soon as the safety gate of the injection-molding machine or the door of the safety guard is opened.

From cutting off and separation of sprues via product removal and deposi-



**Fig. 4.** To eject the sprues, the axis turns to the side through 90° © Engel

tion, through to a highly integrated, inter-linked manufacturing process, Engel developed individual automation concepts for a wide variety of injection molding applications. The basis for this was a comprehensive portfolio of robots and a high level of special automation expertise. This is essential for developing solutions that perfectly meet quality, efficiency and cost-effectiveness requirements without providing additional functions that are not used. ■



**Fig. 5.** The discharge chute for deposition of the sprues is very compactly integrated into the injection molding machines © Engel

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